

AMENDMENTS TO THE CLAIMS

Amendments to the claims are based on Examiner's comments and suggestions for making the claims allowable:

1. (Currently amended) A reactor for the production of nanoparticles in an aerosol process comprising:

- (a) a reaction chamber having a wall, an inlet and an outlet the inlet for introducing a hot carrier gas to the reaction chamber which hot carrier gas flows downward from the inlet through the reaction chamber and out the outlet,
- (b) a quench zone located downstream of the reaction chamber having an inlet and an outlet,
- (c) one or more quench inlets being positioned approximately about the outlet of the reaction chamber for introducing a quench material,
- (d) radially distributed reactant inlets positioned between the reaction chamber inlet and the quench inlets for introducing one or more reactants;

the reaction chamber comprising a spacer zone and a homogenization zone: (i) the spacer zone having a length, (L1), extending from the reaction chamber inlet and ending approximately about the reactant inlets having an upper diameter converging, upstream of the reactant inlets, to a lower diameter tubular region, the spacer zone having a recirculation zone, the reactant inlets being downstream of the recirculation zone and positioned to introduce reactants into the tubular region, which ~~tubular region~~ extends into the homogenization zone, and (ii) the homogenization zone including the tubular region which is followed by a converging section which converges to a nozzle tip, the homogenization zone having a length (L2) extending from approximately the location of the reactant inlets and ending approximately about the quench zone inlet; the spacer zone for allowing the hot carrier gas to carry the reactants downward towards the homogenization zone, the homogenization zone for contacting the reactants under conditions suitable for forming a reaction product and passing the reaction product to the quench zone, (L1) being sufficient for the hot carrier gas to attach to the wall of the spacer zone of the reaction chamber prior to the reactant inlets and (L2) being sufficient for a residence time of the reactants within the homogenization zone suitable for forming the reaction product which when withdrawn from the outlet of the quench zone are nanoparticles.

2. (Original) The reactor of Claim 1, which further comprises a high temperature heating means for heating the carrier gas selected from the group consisting of a DC plasma arc, RF plasma, electric heating, conductive heating, flame reactor and laser reactor.

3. (Original) The reactor of Claim 1, which further comprises a DC plasma arc for heating the carrier gas.

4. (Original) The reactor of Claim 1, which further comprises an RF plasma for heating the carrier gas.

5. (Original) The reactor of Claim 1, wherein the reaction chamber further comprises a homogenizer which provides the spacer zone and the homogenization zone.

6. (Original) The reactor of Claim 5, wherein the homogenizer is constructed of copper or ceramic material.

Claims 7 – 16 (Cancelled)

17. (Currently amended) A reaction chamber for minimizing flow recirculation in a reactor for the production of reaction product nanoparticles, the reaction chamber comprising a wall, an entrance and an exit a hot carrier gas inlet located about the entrance of the reaction chamber and quench material inlets located about the exit of the reaction chamber and radially distributed reactant inlets located between the hot carrier gas inlet and the quench inlets, the reactant inlets being located downstream of a recirculation zone created by the hot carrier gas as it flows downward from the hot carrier gas inlet toward the reactant inlets, the hot carrier gas inlet and reactant inlets being oriented for a downward flow direction of the hot carrier gas and reactants, the reaction chamber comprising a spacer zone and a homogenization zone (i) the spacer zone having a length, (L1), extending from the reaction chamber entrance and ending about the reactant inlets having an upper diameter converging, upstream of the reactant inlets, to a lower diameter tubular region which reactant inlets are positioned to introduce reactants into the tubular region, the tubular region extending into the homogenization zone and (ii) the homogenization zone including the tubular region followed by a converging section which converges to a nozzle tip and having a length (L2) extending from the reactant inlets to a position downstream of the quench inlets for contacting the hot carrier gas and the reactants and wherein (L1) of the spacer zone is sufficient for the hot carrier gas to attach to the wall of the reaction chamber before the hot carrier gas reaches the reactant inlets and (L2) of the reaction chamber being sufficient for a residence time within the homogenization zone suitable for forming the reaction product nanoparticles.

Claims 18 - 22 (Cancelled)

23. (Previously presented) The reactor of claim 1 wherein the reactor is a subsonic reactor.

24. (Previously presented) The reactor of claim 1 wherein the hot carrier gas which flows out the outlet has a gas pressure at the outlet in the range of 1-5 atmospheres.